

Research on the Competitiveness and Complementarity of China's Trade Cooperation with the RCEP Region —— Take the New Energy Vehicle Industry as an Example

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Abstract:

With the increasing global emphasis on sustainable development and a green economy, the new energy vehicle industry plays a significant role in the economic transformation of many countries. China, one of the largest markets for new energy vehicles in the world, actively participates in regional economic cooperation. Among them, international trade with the Regional Comprehensive Economic Partnership (RCEP) has attracted widespread attention. The purpose of this thesis is to examine how China and the RCEP region compete and complement each other in the new energy vehicle sector. By analyzing general situations of bilateral trade and the growth pattern of the new energy vehicle industry chain, it explores the current situation and potential of the trade relationship between the two sides. The findings indicate a high complementarity but a relatively low level of overall competition between the two parties in the new energy vehicle sector. As a result, this paper offers a number of policy recommendations for maximizing trade cooperation in order to support the shared growth of the new energy vehicle sector between China and RCEP member nations.

Keywords: RCEP countries; new energy vehicle; import and export trade; trade competitive index; revealed comparative advantage index.

1. Introduction

Driven by technological progress and policy evolution in various countries, new energy vehicles have

developed rapidly in recent years. The market for new energy vehicles has witnessed explosive growth, with annual sales continuously rising. Meanwhile, new energy vehicles are constantly innovating and

developing, giving rise to new forms of automobiles such as hybrid vehicles. Not only that, cooperation among countries in the field of new energy vehicles is also deepening continuously, and the global new energy vehicle industry is developing steadily [1].

The regional comprehensive economic partnership (RCEP) countries are currently among the largest free trade zones in the world in terms of population and economic scale, and as an emerging industry, the new energy vehicle industry has huge market potential. Studying China's and other RCEP members' complementarity and competitiveness in the trade cooperation of new energy vehicles is therefore essential, according to this report. This research can help countries seize market opportunities, understand and utilize their own advantages, and enhance their competitiveness in the global new energy vehicle market. This will further promote regional economic integration, increase trade liquidity and improve the integration and coordination of the overall regional industrial chain.

Therefore, this article aims to analyze the current market situation by examining the market share, scale and rising tendency of Chinese new energy vehicles in the RCEP member countries' markets [2]. Firstly, the purpose of this report is to examine the current situation, trends, and characteristics of new energy vehicle trade between China and other RCEP member countries by gathering and analyzing relevant trade data. Secondly, this paper compares the competitiveness and complementarity of China and different RCEP countries in the new energy vehicle industry, in order to conduct a comparative analysis of different market structures and models [3].

2. An Overview of Bilateral Trade between China and RCEP Countries

2.1 The Overall Bilateral Trade Situation between China and RCEP

From 2012 to 2023, China's exports to other RCEP countries showed a significant upward trend (see Table 1). This indicates that China's economic and manufacturing strength has been continuously enhanced, and its competitiveness in the global value chain has also been constantly strengthening. Meanwhile, the increased demand for Chinese export goods from other RCEP member countries indicates that the economic development and consumption capacity within the region have improved, providing a favorable market environment for China's exports.

However, China's total imports from other RCEP member countries have shown a fluctuating upward trend. From this perspective, the trade relationship between China and other RCEP countries is becoming more intimate. The resources and industrial structures of other RCEP countries each have their own characteristics. Some of their components and technologies can have positive significance for Chinese goods, promoting the complementarity of bilateral trade and strengthening economic ties within the region.

All the data in this article is collated and calculated based on UN Comtrade.

Table 1. Overall bilateral trade situation of China with RCEP [4]

Year	China's total exports to RCEP member countries (in billions of dollars)	China's total imports from RCEP member countries (in billions of dollars)
2012	4851.74	6328.08
2013	5270.23	6520.85
2014	5656.54	6684.06
2015	5594.19	5919.77
2016	5210.21	5789.88
2017	5660.04	6836.98
2018	6279.13	7715.81
2019	6676.96	7615.21
2020	6982.69	7794.92
2021	8589.84	9917.52
2022	9908.38	9502.86
2023	9117.79	8793.29

2.2 The Bilateral Trade Situation Regarding New Energy Vehicles

The article selects the panel data of RCEP countries from 2012 to 2023. The specific customs HS codes are shown in Table 2. Due to the absence of data in some categories, this paper mainly analyzes HS870240, HS870340, HS870360, HS870380 and HS870911.

Table 3 shows that the total volume of new energy vehicles exported from China to other RCEP member countries has been continuously rising. From only exporting to Japan in 2017 to 2023, the total export volume has increased by approximately 162 times. This indicates that the demand for China's new energy vehicles from RCEP countries has significantly increased. China's new energy

vehicles in the international market are becoming more competitive on a daily basis, as can be seen. This may be due to the continuous advancement and progress made by Chinese new energy vehicle enterprises in technological innovation, production capacity and cost control, the strong support of the Chinese government, as well as the enhanced trade liquidity among RCEP countries and the transformation of green consumption concepts [5].

Similarly, the total amount of new energy vehicles imported by China from other RCEP member countries has also shown an upward trend. From 2017 to 2023, it has grown by about four times, which indicates that China is seeking more diverse sources of new energy vehicles and promoting the interaction of two-way trade.

Table 2. Customs HS Codes and Product Categories [4]

HS6	Product Category
870220	Vehicles; public transport equipped with both a compression ignition piston internal combustion engine (diesel or semi-diesel engine) and a drive electric motor
870230	Vehicles; public transport equipped with both a reciprocating piston internal combustion engine and a driving electric motor
870240	Vehicles; public transport equipped only with a drive motor
870340	Other vehicles equipped with both ignition reciprocating piston internal combustion engines and drive electric motors, except those that can be charged by plugging in an external power source
870350	Other vehicles equipped with both compression ignition piston internal combustion engines (diesel or semi-diesel engines) and drive electric motors, except those that can be charged by plugging in an external power source
870360	Vehicle that is equipped with both a reciprocating piston internal combustion engine and a drive electric motor and can be charged by plugging in an external power source
870370	A vehicle that is equipped with both a compression ignition piston internal combustion engine (diesel or semi-diesel engine) and a drive electric motor and can be charged by plugging in an external power source
870380	Vehicles equipped only with a drive moto
870911	Electric short-distance freight vehicles; Electric station combined traction

Table 3. China's new Energy Vehicle import and export Trade with RCEP [4]

Year	China's exports to RCEP member countries (\$)	China's imports from RCEP member countries (\$)
2012	4545269	10847251
2013	5011967	3339534
2014	5654736	2187835
2015	5326451	2582419
2016	5765624	2215901
2017	46978461	890357048
2018	55525000	1422372646
2019	135303400	3067442531
2020	150429117	4123168781
2021	1171981277	4697448767
2022	3197164603	4229561740
2023	7662276548	4564530170

Not only that, China and other RCEP countries are experiencing a continuous growth in their total trade volume, which indicates that the economic relations between the two sides are constantly strengthening and economic exchanges between countries are becoming increasingly close. Meanwhile, with the economic development and the improvement of consumption levels in RCEP countries, the market demand for products and services has increased, driving the growth of trade volume. This also reflects the positive trends of regional economic integration and global economic recovery.

Overall, China has seen an increase in its exports and imports of new energy vehicles to other RCEP member countries, indicating that the cooperation and interaction among countries in the region regarding new energy vehicles have become closer, and a good industrial collaboration relationship has been formed [6]. Regarding the future development trend, the current global electric vehicle market is growing rapidly, and the concept of green and sustainable development is increasingly deeply rooted. Against this backdrop, this article holds that China is expected to continue expanding its exports of new energy vehicles to RCEP countries, seek to introduce innovative technologies and further improve of the domestic market.

3. Analysis of the Competitiveness and Complementarity of New Energy Ve-

hicles between China and RCEP Member Countries

3.1 Trade Competitive Index

This paper adopts the TC Index to measure trade competitiveness at the overall level. The specific calculation method of the TC index is as follows:

(1)

In the above formula, X represents the export value of various new energy vehicle products of each RCEP member country, and M represents the import value. The TC index ranges from -1 to 1. The TC index being close to 1 means that the country's trade competitiveness is very strong. When the index approaches -1, it indicates that the trade competitiveness is relatively weak. If the TC index is 1 then the country only exports and not imports. When the index is -1, it implies that the country is solely importer and not exporter. The country's trade competitiveness is moderate when the index is 0 [6].

Table 4 shows the fluctuations of the TC index related to new energy vehicle trade between China and other RCEP member countries from 2017 to 2023. Due to the scarcity of data on the import and export of new energy vehicles in some countries, this article takes China, Australia, Japan, and South Korea as examples, and simultaneously explains and analyzes three specific product types: HS870360, HS870380 and HS870911.

Table 4. TC Indices of Various Countries from 2017 to 2023 [4]

Country	HS870360			HS870380			HS870911		
	2017	2023	Fluctuation	2017	2023	Fluctuation	2017	2023	Fluctuation
China	0.71	-0.36	-1.07	0.93	0.91	-0.02	-0.41	0.91	1.32
Australia	1.00	1.00	0.00	1.00	1.00	0.00	0.99	0.99	0.00
Japan	-1.00	-0.78	0.22	0.83	0.10	-0.73	-0.84	0.74	1.58
Korea	1.00	1.00	0.00	1.00	0.82	-0.18	-0.74	1.00	1.74

The differentiation trend of China's competitiveness in the new energy vehicle industry is evident in Table 4. Specifically, for the product HS870360, China's TC index dropped significantly from 0.71 in 2017 to -0.36 in 2023, indicating that China is facing considerable competitive pressure in this market segment, especially from strong rivals in Australia and South Korea. In contrast, the TC index of Australia and South Korea for this product has consistently remained at 1.00, demonstrating their market dominance. For HS870380, China's TC index slightly decreased from 0.93 to 0.91. The competitiveness was relatively stable, but no significant improvement was observed either. On the contrary, Japan's TC index for this product dropped significantly, from 0.83 to 0.10, indicating a weakening of its market share. In the more

optimistic HS870911 product, China's TC index rose significantly from -0.41 to 0.91, indicating that, in this regard, technological progress or growth in market demand in our country has driven a significant improvement in its competitiveness. It is worth noting that the competitiveness of Japan and South Korea in this product has also significantly improved.

These data indicate that the competitiveness of China's new energy vehicles is showing different changing trends. Therefore, China's new energy vehicles urgently need to adjust their technological research and development and market strategies to enhance their competitive edge in the international market.

3.2 Revealed Comparative Advantage Index

This article analyzes the complementarity of China and other RCEP countries in the trade cooperation of new energy vehicles by analyzing the Revealed Comparative Advantage Index. The RCA Index is an effective indicator of how competitive a country's products or industries are in the international market. The objective is to quantitatively describe the relative export performance of different industries or industrial groups within a country. Its calculation formula is:

(2)

Among them, Xa^i represents the export value of Class i commodities in a specific set of goods in region a , Xa represents the total export value of the specific set of goods in region a , Xw^i represents the export value of Class i commodities in a specific set worldwide, and Xw represents the total export value of the specific set of goods worldwide [7]. When $RCA > 2.5$, it shows that commodity exports are highly competitive internationally. When $2.5 \geq RCA \geq 1.25$, it suggests that the export of this type of product in this region has strong international competitiveness. When $1.25 \geq RCA \geq 0.8$, it indicates that the export of this type of commodity in this region has moderate international competitiveness. When $RCA < 0.8$, it shows that its competitiveness is weak. The RCA index calculation of new energy vehicle products in China and West Asia is shown in Tables 5 and 6.

Table 5 indicates that China's HS870240 and HS870911 are involved in the new energy vehicle industry. Compared with other types of products, electric station traction has a strong competitive edge. This might be because China has invested a great deal of human and energy in the research and development of battery technology, electric motors and other key technologies, with a relatively high overall technical level. The performance and reliability of the products are relatively stable and advantageous. However, the competitive edge of products like HS870240 in China has declined from extremely strong international competitiveness in 2017 to moderate international competitiveness in 2023. This might be because, as the global new energy vehicle market develops, especially as regions such as Europe and the United States start to invest more resources in the electric vehicle industry, international competition is intensifying. Not only that, other products in China's new energy vehicle industry, including HS870340, HS870360 and HS870380, show relatively weak competitiveness in their RCA index analysis. This might be because these types of vehicles usually involve more complex power systems (such as hybrid power, etc.) and have higher technical requirements. Moreover, at present, the consumer market in our country has a higher willingness to consume pure electric vehicles than those using hybrid and other complex power systems.

Table 5. China's RCA index [4]

Year	HS870240	HS870340	HS870360	HS870380	HS870911
2017	6.17	0.06	0.02	0.23	3.59
2018	3.72	0.03	0.03	0.13	2.75
2019	2.61	0.01	0.04	0.16	1.64
2020	1.95	0.01	0.02	0.04	1.30
2021	1.81	0.01	0.03	0.26	0.72
2022	1.25	0.02	0.04	0.26	0.44
2023	0.90	0.03	0.01	0.35	0.32

Table 6. The RCA index of RCEP countries [4]

Year	HS870240	HS870340	HS870360	HS870380	HS870911
2017	0.0000	0.0930	0.0001	0.0002	0.0175
2018	0.0000	0.1409	0.0001	0.0001	0.0307
2019	0.0000	0.2367	0.0002	0.0003	0.0429
2020	0.0003	0.2936	0.0001	0.0057	0.0914
2021	0.0000	0.2787	0.0002	0.0079	0.0919
2022	0.0000	0.2480	0.0092	0.0064	0.0578
2023	0.0000	0.2916	0.0326	0.0175	0.0164

By observing the RCA indices of other RCEP countries in Table 6, it can be found that for most products within

the new energy vehicle industry, the overall international competitive ability of other RCEP countries is relatively

weak, with their RCA indices all below 0.8. This might be because some RCEP member countries, such as Laos and Vietnam, are less developed and have a relatively weak overall economic foundation. Technological research and development and industrial investment are relatively insufficient; Meanwhile, many RCEP countries have invested far less in technological research and development in the field of new energy vehicles than developed countries, resulting in a lack of competitiveness in core areas such as battery technology, electric motors and intelligence. Therefore, these countries have relatively poor competitiveness in the new energy vehicle industry. However, the table also shows that since 2020, the RCA index has generally been on an upward trend. This might be due to the signing of the RCEP trade agreement, which has provided more favorable market access conditions for member states, reduced trade barriers, promoted economic cooperation among member states, and made it easier for countries to collaborate on resources, technology, and markets.

4. Discussion

When analyzing the competitiveness and complementarity between China and RCEP countries in the new energy vehicle industry, it can be concluded that: With the increasingly close trade ties among RCEP countries and the growing emphasis on green development by the countries, especially the increasing demand for new energy vehicles in Southeast Asia and the Asia-Pacific region, China's new energy vehicle manufacturing industry will find huge opportunities in these markets. It is expected that China's exports of new energy vehicles and related products to RCEP countries will continue to increase in the future [7]. Further analysis reveals that the trade relations between China and RCEP countries often manifest as complementarity rather than direct competition. Therefore, these countries may export more components, raw materials and new energy vehicle technologies to China. Meanwhile, the new energy vehicle industrial chains of RCEP countries and China will also tend to be deeply integrated, which may further promote technological cooperation and innovation between the two places, jointly develop the market and enhance competitiveness.

Not only that, but the competitiveness between China and the RCEP countries is not strong. This might be because the degree of economic progress and industrial structure of RCEP countries are different from those of China. Many RCEP countries are relatively low in manufacturing, technological level, market demand and other aspects. In this case, the high value-added products produced in China have formed a good complementarity with the products and services needed by RCEP countries [8]. Meanwhile, RCEP countries have abundant resources in

certain raw materials and primary products, while China has advantages in high-end manufacturing and technology. The geographical locations among RCEP countries are also important influencing factors. Because RCEP countries are geographically close to China, their market access costs are relatively low. Both sides have advantages in logistics and supply chain management. At the same time, they can respond more quickly to changes in each other's market demands.

Finally, policy is also a very important reason. The RCEP trade agreement has promoted trade facilitation within the region, reduced tariffs and non-tariff barriers, and, to a certain extent, eliminated trade frictions, making countries more inclined to cooperate with China rather than compete. Meanwhile, the Chinese government attaches great importance to regional cooperation in trade with RCEP countries and has adopted proactive trade policies to enhance economic ties between the two sides. This policy has exacerbated the competitive advantage between China and the RCEP countries.

China and RCEP countries in the new energy vehicle industry are becoming increasingly close. Although there is competitive pressure in some niche markets, on the whole, the complementarity and cooperation potential between the two sides remains strong [9]. Driven by increasing market demand and favorable trade policies, China's new energy vehicle exports to the RCEP market are expected to maintain steady growth. At the same time, through deeper cooperation and technological exchanges, the overall competitiveness will also be enhanced.

Based on the above analysis, against the backdrop of the government's vigorous promotion of trade exchanges between China and RCEP, the upgrading and improvement of China's new energy vehicle industry chain have led to a continuous increase in export volume. Therefore, this paper puts forward the following suggestions:

(1) Formulate green car purchase subsidy policies and promote low-carbon technology cooperation:

The Chinese government can formulate and promote subsidy policies for the purchase of new energy vehicles, encourage environmentally friendly travel, and increase consumer demand for these vehicles [10-12]. At the same time, this way encourages the application and promotion of renewable energy in the manufacturing of new energy vehicles, as well as the study and development of low-carbon production technologies. In other words, while promoting the increase in the export and demand of new energy vehicles to drive China's economic development and the trade flow among RCEP countries, it also promotes the country's green and sustainable development.

(2) Strengthen scientific research cooperation and financial support:

China can establish a special scientific research fund to

accelerate the advancement of the new energy vehicle industry and related component industries, stimulate the in-depth integration of the new energy vehicle industry chain, and further expand China's relative advantages in high-end manufacturing and technology. Bilateral or multilateral technology transfer and exchange activities can also be held regularly to promote technology sharing and common progress among researchers from different countries. By strengthening scientific research cooperation and financial support, it can help China develop emerging technologies, promote the production and research and development of high value-added products in China, and contribute to better seizing the current market demands and development opportunities of emerging industries.

(3) Strengthen market access and trade facilitation:

This article suggests that under the RCEP trade agreement, all countries should actively promote the reduction and exemption of tariffs on new energy vehicles and their components, lower trade barriers, and at the same time facilitate cooperation in their local markets to ensure that products can smoothly enter the markets of various countries. In addition, China is encouraged to sign bilateral investment agreements with different RCEP member countries, clarify the legal rights and interests of investors, protect the investment environment, and encourage more capital to flow into the new energy vehicle sector. Through policy alignment and tariff reduction, not only can the operating costs of enterprises be lowered, but also consumers' desire to purchase new energy vehicles can be stimulated, further expanding market demand.

5. Conclusion

Through an in-depth analysis of the bilateral trade situation, it can be known that as the world's attention to green development and sustainable development deepens day by day, the global market's demand for new energy vehicles is constantly increasing. As a result, China's new energy vehicle manufacturing industry can discover huge opportunities in these markets. This article predicts that China's exports of new energy vehicles and related products to RCEP countries will continue to increase in the future. With its massive population and economic size ranking among the world's top free trade zones, the RCEP agreement has also promoted trade exchanges and cooperation among countries. Deeper cooperation between China and RCEP member states will serve as a key driver for regional economic integration and sustainable growth. However, the RCA index and TC index selected in this paper are both static analyses based on a certain point in time and are difficult to reflect the long-term impact of rapid technological iteration, policy changes and market dynamics in the new energy vehicle industry on competitiveness and

complementarity. The following research can further analyze the dynamics of new energy vehicle trade between China and RCEP countries based on the research in this article.

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